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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/892,586	06/27/2001	Paul Turner	1086.2002-001	2279

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EXAMINER

SHARON, AYAL I

ART UNIT	PAPER NUMBER
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2123

DATE MAILED: 08/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/892,586

Applicant(s)

TURNER ET AL.

Examiner

Ayal I. Sharon

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— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Introduction

1. Claims 1-24 of U.S. Application 09/892,586, originally filed on 06/27/2001 are presented for examination. The case claims priority to provisional application 60/214,875, filed on 06/29/2000. Claims 1, 5, 7, 8, 10, 11, 15, 17, 18, 20, 21, 22, 23, and 24 have been amended.

Allowable Subject Matter

2. The following are statements of reasons for the indication of allowable subject matter.
3. In regards to Claim 16, neither the Treiber reference nor the Wassick reference expressly teach the following limitations:
 16. The computer apparatus of Claim 15, wherein the non-linear transfer function includes the log of a hyperbolic cosine function.
4. In regards to Claims 17-19, Examiner finds that U.S. Patent 6,654,649 ("the Treiber reference"), in combination with U.S. Patent 5,877,954 ("Klimasauskas et al.") teach the claimed limitations. However, both U.S. Patents were assigned to the assignee of the current application at the time the invention was made. Therefore, 35 U.S.C. 103(c) applies.
5. In regards to Claim 22, Wassick does not expressly teach the following limitations:

calibrating the non-linear network model based on empirical inputs by using a bound on a derivative of the base non-linear function to constrain parameters of the model in order to produce a constrained model with global behavior.

6. In regards to Claim 23, Wassick does not expressly teach the following limitations:

a calibrator coupled to the model constructor for calibrating the non-linear network model based on empirical inputs by using a bound on a derivative of the base non-linear function to constrain parameters of the model in order to produce a constrained model with global behavior.

7. In regards to Claim 24, Wassick does not expressly teach the following limitations:

calibrate the non-linear network model based on empirical inputs by using a bounded derivative of the base non-linear function to constrain parameters of the model in order to produce a constrained model with global behavior.

Claim Rejections - 35 USC § 101

8. Claims 1-24 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claims are directed to an abstract mathematical algorithm. The claimed invention is therefore not concrete or tangible. **See MPEP §2106 (A)**, and *In re Warmerdam*, 33 F.3d 1354, 1360, 31 USPQ2d 1754, 1759 (Fed. Cir. 1994). See also *Schrader*, 22 F.3d at 295, 30 USPQ2d at 1459.

9. MPEP §2106 (A) states that:

- a. "The claimed invention as a whole must accomplish a practical application. That is, it must produce a "useful, concrete and tangible result." *State Street*, 149 F.3d at 1373, 47 USPQ2d at 1601-02. The purpose of this requirement is to limit patent protection to inventions that possess a certain level of "real world" value, as opposed to subject matter that represents nothing more than an idea or concept, or is simply a

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starting point for future investigation or research (*Brenner v. Manson*, 383 U.S. 519, 528-36, 148 USPQ 689, 693-96); *In re Ziegler*, 992, F.2d 1197, 1200-03, 26 USPQ2d 1600, 1603-06 (Fed. Cir. 1993))."

- b. "The claimed invention as a whole must produce a "useful, concrete and tangible" result to have a practical application."
- c. Office personnel have the burden to establish a prima facie case that the claimed invention as a whole is directed to solely an abstract idea or to manipulation of abstract ideas or does not produce a useful result. Only when the claim is devoid of any limitation to a practical application in the technological arts should it be rejected under 35 U.S.C. 101. Compare *Musgrave*, 431 F.2d at 893, 167 USPQ at 289; *In re Foster*, 438 F.2d 1011, 1013, 169 USPQ 99, 101 (CCPA 1971).

10. Claims 1-24 do not produce a "useful, concrete and tangible" result. The claimed invention does not produce any useful output. MPEP §2106 (A) provides examples of "useful, concrete and tangible" results.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. The prior art used for these rejections is as follows:

13. Wassick et al., U.S. Patent 5,740,033. (Henceforth referred to as "**Wassick**").

This reference is referred to as "McCroskey" in the International Search Report submitted by the Applicants on 2/26/02. It is cited as being an "X" reference towards claims 1, 11, and 21-24 in that search report.).

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14. Treiber et al., U.S. Patent 6,654,649. (Henceforth referred to as "Treiber")

15. The claim rejections are hereby summarized for Applicant's convenience. The detailed rejections follow.

16. Claims 1, 11, and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Wassick.

17. In regards to Claim 1, Wassick teaches the following limitations:

1. A computer-implemented method for modeling a non-linear empirical process, said method comprising the steps of

creating an initial model generally corresponding to the non-linear empirical process to be modeled, the initial model having an initial input and an initial output;

(See Wassick, especially: Fig.5, and col.9, lines 5-55)

constructing a non-linear network model based on the initial model, the non-linear network model having multiple inputs based on the initial input and a global behavior for the non-linear network model as a whole that conforms generally to the initial output; and

(See Wassick, especially: col.9, line 55 – col.12, line 10)

calibrating the non-linear network model based on empirical inputs by constraining parameters of the model to produce a constrained model with global behavior of the non linear network model.

(See Wassick, especially: col.11, line 50 – col.12, line 10)

18. Claim 11 is rejected based on the same reasoning as claims 1. Claim 11 is a computer apparatus claim that recites the equivalent limitations as recited in method claim 1, and taught throughout Wassick.

19. In regards to Claim 21, Wassick teaches the following limitations:

21. A computer program product that includes a computer usable medium having computer program instructions stored thereon for building a model for modeling a non-linear empirical process, such that the computer program instructions, when performed by a digital processor, cause the digital processor to:

create an initial model generally corresponding to the non-linear empirical process to be modeled, the initial model having an initial input and an initial output;

(See Wassick, especially: Fig.5, and col.9, lines 5-55)

construct a non-linear network model based on the initial model, the non linear network model having multiple inputs based on the initial input and a global behavior for the non-linear network model as a whole that conforms generally to the initial output; and

(See Wassick, especially: col.9, line 55 – col.12, line 10)

calibrate the non-linear network model based on empirical inputs by constraining parameters of the model to produce a constrained model with global behavior.

(See Wassick, especially: col.11, line 50 – col.12, line 10)

Response to Amendment

Re: Claim Rejections - 35 USC § 101

20. Applicants' arguments (see p.9 of Amendment filed 6/13/05) are unpersuasive.

The amended claims are still not statutory because they do not recite a "concrete, useful and tangible" result.

Re: Double Patenting and 35 USC § 102 – Treiber Reference

21. The Applicants unpersuasively argue (see p.9 of Amendment filed 6/13/05) that while Claim 1 of the Treiber reference is directed to a "controlling a non-linear manufacturing process", the instant application "... can be used to model any form of empirical process ... For example, stock market simulations, chemical process control, etc." Examiner finds this to be merely a distinction of intended use.

22. In response to Applicants' intended use argument, Examiner notes that a recitation of the intended use of the claimed invention must result in a structural

difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 370 F.2d 576, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 312 F.2d 937, 939, 136 USPQ 458, 459 (CCPA 1963).

23. On the other hand, Applicants' argument regarding the 35 U.S.C. §102 rejections (see para. 4, p.11 of the Amendment filed 6/13/05) is persuasive and applies also to the double patenting rejection. The limitation "... calibrate the non-linear network model ..." in the instant application differs from the "...the optimizer utilizing a non-linear model of the subject process for updating the linear model ..." in the issued patent.

24. Examiner also notes the differences in the specifications of the issued patent and the instant application. Both the issued patent and the instant application recite the use of assignee's products "**DMCplus**" and "**DMO/SQP**". On the other hand, the instant application refers to a "model constructor 36 is a generator of a non-linear network", while the issued patent refers to a "steady state model." See paragraph [0035] of the PG-PUB of the instant application (PG-PUB 2002 / 0072828), and the abstract of the Treiber patent.

The instant application teaches the following in paragraph [0035] of the PG-PUB:

[0035] In FIG. 1, the optimizer 38 is preferably an optimizer from the Aspen Open Solvers library of optimizers provided by Aspen Technology,

Inc, of Cambridge, Mass. (assignee of the present invention). One such optimizer is DMO/SQP.RTM. also of Aspen Technology, Inc. Other non-linear optimizers may be suitable for use with the invention. In a preferred embodiment, the controller is Aspen Apollo, part of the Aspen Advantage Control Suite provided by Aspen Technology, Inc. Another controller 26 suitable for use with the invention is DMC Plus.RTM. by Aspen Technology, Inc. **In one embodiment, the model constructor 36 is a generator of a non-linear network, such as provided by Aspen IQ.TM. by Aspen Technology, Inc.**

The issued patent teaches the following in the abstract:

A first principles, steady state model of a desired polymer process is applied with a non-linear optimizer to a linear controller. Model process gains and optimal target values for controller variables result. These results are utilized by a multivariable linear controller to achieve nonlinear control of the subject process. Preferably the nonlinear optimizer is DMO/SQP. **The steady state model is produced by Polymers Plus and the linear controller is DMCplus,** all of Aspen Technology, Inc. in Cambridge Mass.

25. The double patenting rejections and the 35 U.S.C. §102 rejections in view of Treiber have therefore been withdrawn.

Re: Claim Rejections - 35 USC § 102 – Wassick Reference

26. The Applicants unpersuasively argue (see p.11 of Amendment filed on 6/13/05)

that:

Wassick is not concerned with building a globally constrained empirical model, but with computing process responses over a prediction horizon using constraint equations. (Col.10, lines 35-36)

Furthermore, by reciting the use of equations representing physical process constraints, Wassick specifically teaches away from constraining a non-linear model using empirical inputs, teaching, instead, to use physical or first-principles, model for constraining and calibration. (Col.11, lines 50-55).

27. In regards to Applicants' argument that "Wassick is not concerned with building a globally constrained empirical model", Examiner finds that the Applicants have selectively cited the relevant section of Wassick. Wassick teaches (see Col.10, lines 32-41. Emphasis Added):

Nonlinear model predictive control (NMPC) may be characterized as an advanced process control technique in which a "nonlinear" dynamic model is used to predict future process behavior. The dynamic model is used for computing the process responses over a prediction horizon, which is based on the values of the manipulated variables **and the current controlled variable values**. The values of the manipulated variables are optimized at discrete points throughout a control horizon to minimize the error between the desired set of point profile and the predicted outputs.

Examiner interprets that the use of "current controlled variable values" make the model "empirical". The "optimization" of the "manipulated variables" make the model "globally constrained".

28. In regards to Applicants' argument that "Wassick specifically teaches away from constraining a non-linear model using empirical inputs", Examiner finds that Wassick's teaching that "The dynamic model is used for computing the process responses over a prediction horizon, which is based on the values of the manipulated variables **and the current controlled variable values**" shows that empirical inputs **are** used to constrain the non-linear model.

29. Applicants' amendment of the claims to replace "optimizing" with "calibrating" does not differentiate the instant claims from the prior art, because Examiner finds these to be equivalent terms.

Conclusion

30. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ayal I. Sharon whose telephone number is (571) 272-3714. The examiner can normally be reached on Monday through Thursday, and the first Friday of a biweek, 8:30 am – 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached at (571) 272-3749.

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Any response to this office action should be faxed to (571) 273- 8300, or
mailed to:

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USPTO
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Any inquiry of a general nature or relating to the status of this application
or proceeding should be directed to the Tech Center 2100 Receptionist, whose
telephone number is (571) 272-2100.

Ayal I. Sharon

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August 12, 2005


Paul L. Rodriguez 8/19/05
Primary Examiner
Art Unit 2125